these few simple tests together for the use of men who like myself are employed in clinical work. For the trained laboratory man one method may be as good as another and he selects those which best serve his needs. The Nonne, albumen estimation and cell count are probably sufficient to show in most cases whether or not there is any inflammatory change in the central nervous system and for the purposes outlined in this paper that is what is desired.

With regard to the statement of Dr. Schaller that 10 cells per c.m.m. is rather high I would say that this number was taken arbitrarily. I agree with him that for accurate estimation 6-8 would come nearer being the number normally present. I do not think so much reliance should be placed upon the number of cells because with old and young cells present the number is not a definite indication of the extent of the process producing them.

The acetic acid staining mixture aids in differentiating young from old cells but for accurate cytologic work some such method as that of Alzheimer is necessary and this takes too much time for practical purposes.

A sensitive gold solution will show finer syphilitic changes than the Wassermann. The change in the formula is due to an effort to make the reaction more specific, that is, to cause the color change to cling more closely to certain dilutions. This has been shown to be possible to some extent at least in that with this formula the reaction in syphilitic diseases occurs first in dilutions of 1:40 and 1:80.

It was not intended to recommend the indiscriminate performance of lumbar puncture in all cases of known syphilis, but rather, first—to urge its performance at the close of treatment of cases of general syphilis in order to determine that the central nervous system is healthy before dismissing the case as cured, and, second—to outline a systematic method of cerebro-spinal fluid examination which could be easily and safely followed.

AUTONOMIC REFLEXES FROM THE DIGESTIVE TRACT.*

By HARRY B. REYNOLDS, M.D., Palo Alto.

The progress made in diagnosis of diseases of the digestive tract in the last decade is little short of phenomenal. In the past our only avenues of approach were through the subjective history, a physical examination and laboratory studies. The work of Paulow and others working along lines of experimental physiology has formed anew our conceptions of the process of digestion. The studies of Cannon, Hertz, Meltzer and others have accumulated a mass of data on the motility of the digestive canal no less startling than the late discoveries on the heart beat. The Roentgen rays, experimentally and clinically applied, have amassed facts which bring us closer to absolute precision in our diagnosis.

Still another approach lies in a study of visceral neurology. Investigators along special lines have worked out the anatomy of the so-called autonomic system, but its physiology is less clear, being obscured by the intricacies of hormone action, internal secretion, psychic influence and the contradictory evidences of experimentation. It is clear, however, that the various secretory and motor activities of the digestive tube with its accessory glands, while largely local in their origin, are under the general supervision of a nervous mechanism consisting of two factors, the one inhibitory, the other stimulating in its influence.

The activity of this nervous mechanism, however, is not limited to the digestive function. Both the sympathetic and the autonomic systems are concerned with the control of other glands and functions. This circumstance becomes of importance in diagnosis in that the nature of an abnormality in the function of a digestive organ can often be surmised from a concurrent variation in the physiology of the heart, blood vessels, pupils, respiration, etc. Thus the study of these reflexes becomes useful to us both in determining the nature of an abnormality in the digestive tract, and, conversely, in recognizing from a digestive symptom an extra-digestive organic cause.

Another matter well worth study is the very real effect of psychic influence on the functioning of the digestion. To one who only half appreciates this fact the recounting of the experiments of Paulow is very enlightening. We all recognize such outstanding truths as the gastric stasis under emotional strain, the vomiting of a meal during grief, anger or other powerful emotion, but few clinicians give due weight to the influence of prolonged grief, worry, fear, mental depression, discouragement, domestic unhappiness in the causation of constipation, spastic colitis, gastric atony, colonic stasis, and even enteroptosis. Yet a recognition of this very frequent relation will often lead to a cure or the avoidance of a useless nephropexy or colon short-circuiting. When one is confronted by a patient complaining of a digestive disturbance, a little reflection will readily disclose that not all of the symptoms complained of can be directly referred to the lesion discovered but that part of the picture is due to abnormal functioning of distant organs reflexly influenced, while still other complaints may be referred to the psychic state of the individual resulting from subconscious effects of the first two groups of symptoms. Let me illustrate:

Case I. A middle-aged lady, formerly treated for several years for neurasthenia, came complaining of indigestion, vomiting, hunger-pain, tremendous constipation with spastic colitis, frequent bleeding from the bowel, loss of flesh and prostration. An operation for ulcer of the pylorus vastly improved her for two years. Her husband then developed progressing heart disease, during the course of which she devotedly nursed him and during which time she remained perfectly well. Three weeks after his death, unoccupied and depressed, her constipation returned and the mucous colitis again developed in an exaggerated degree. It then became necessary for her to earn her living and, as a means to this end, she took up practical nursing. During her first case, again occupied and forgetful of her misfortunes, she again vastly improved and she has been busy and in excellent health to the present time.

In this case is clearly displayed the relation in the symptom picture of the basic organic lesion, the reflex irritative symptoms and the psychic factor each with its influence in the sum total of symptoms. Moreover, the effect is demonstrated of surgically relieving the proximate cause and of psychically, by occupation and forced interest in the affairs of others, relieving those symptoms built up on the neurosis.

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It is well, therefore, particularly in the diseases of the digestive system, that the diagnostician keep well in mind this analytic scheme of the symptom picture, viz:

1. The symptoms definitely referrable to the local lesion;

2. The symptoms due to reflexes through or irradiation into other branches of the spinal and vegetative nervous system;

3. The symptoms due to the psychic state arising from the first two.

On the other hand I would warn against carrying this scheme to absurd lengths and attempting to push the refinements of diagnosis beyond reasonable limits. Thus one is tempted to regard with scepticism the claims of A. Thies [1] who states that "with appendiceal diarrhea there is no difference in the pupils unless the appendix is turned up on the cecum" and that the "pupils are found constantly more symmetrical in adhesions of the hepatic flexure though this was not so with other parts of the colon."

The reflexes along the spinal nerves described by Head and Mackenzie and due to an irritability of cord segments from excitation of visceral nerves are familiar to all. When these reflex sensitive areas are present they are of considerable service in diagnosis and fairly dependable but they are by no means constantly present and are therefore only of service when found. Moreover, the hyperesthesias of Head and Mackenzie often confuse the direct sensitive points of local abdominal disease. In these cases careful study is necessary. Thus in a case of gastric ulcer I was able to find several definitely tender points in the upper abdomen, these points varying from day to day. After rest, starvation and poulticing, the hyperesthesias disappeared leaving only the one constant and consistently tender point to the right of the navel of diagnostic significance.

The reflex irritations of the sympathetic and vagus nerves due to disturbances along the digestive tube are still less understood. They are not consistent and dependable and no rules can be laid down associating given reflexes with given and constant diseased conditions, but when these reflexes do occur it should be recognized that they may be indicative of possible remote conditions which should therefore be carefully sought.

Cooper [2] has shown clinically the association between extrasystole in the heart and disease of the gall bladder and dilated stomach. Hence when one finds extrasystole one should bear in mind these possibilities of reflex irritation along the digestive tube. Moreover, a rhythm disturbance may be associated with digestive errors, both conditions being due to an irritative cause at a distance.

Case II. A widow, 38 years of age, presented symptoms of gastric indigestion with gas and distress following food and associated with a bradycardia of such considerable seriousness as frequently to cause fainting following a hot bath. The pulse usually ran 48 to 50. Incidentally menorrhagia was an old complaint. Investigation of the latter disclosed a pelvic mass the size of an orange which on operation proved to be an old ectopic pregnancy. Removal of the mass resulted in relief from the gastric symptoms and a return of the heart to the normal rhythm.

Albutt [3] tells us that in an irritable heart with an upset rhythm "the vomit of a little sour mucus or the discharge of an offensive stool will often set matters right."

Godlewski [4] has taken therapeutic advantage of this reflex when he recommends in attacks of paroxysmal tachycardia the swallowing of a large bolus of some rough, coarse food, thus upsetting the reflex arc by stimulating the vagus through the gullet. He cites two cases in soldiers in whom the attacks were readily aborted by swallowing a large piece of bread crust.

Osler tells of a physician who had through forty years suffered from a tachycardia the attacks of which he could regularly control by the drinking of ice water.

It is not a rare occurrence to find an active salivation resulting as a reflex from an abdominal complaint. A patient suffering from recurrent gall stone colics tells me that he is warned of an impending attack by a nausea and profuse salivary flow.

On the part of the lungs there are certain abnormalities reflexly referrable to disorders of the digestive tube. Thus an obstinate asthma may be the manifestation of vagus hypertonie induced by constipation. These cases are not to be confused with those toxic cases due to the circulation in the blood of certain of the amine bodies, notably histidin, resulting from erratic protein digestion or failure of detoxication on the part of the liver. As a result of a seemingly true reflex asthma may be cited the following case:

Case III. Wm. M., 30 yrs. of age, had suffered from bronchial asthma for several years. He had moved to Palo Alto hoping for a benefit from the climatic change but his asthma continued. Nose and throat treatment had failed to benefit him. On bending our efforts to the relief of a severe constipation the asthma was immediately and vastly improved though an occasional mild attack accompanied nasal or bronchial colds.

The case illustrates Hemmeter's statement that where a reflex vagus hyperactivity occurs it is likely to affect an organ already the seat of irritation.

The following case illustrates the occurrence of chronic asthma and bronchitis apparently caused and maintained reflexly by gall bladder inflammation:

Case IV. E. M., aged 16, had for several years an obstinate asthmatic condition with cough which was sometimes much worse than others, but never entirely disappeared. At times it incapacitated her from her school work while usually she was able to be about and accomplish the usual enterprises of girlhood. She had been examined by several specialists for tuberculosis but the bacillus had never been found.

I was called to see her by her attendant for a recently formed inflammatory mass under the right rectus causing chills, fever, prostration and pain.

Recognizing a circumscribed abscess which I took to be of probable gall bladder origin, I advised operation.

I found a large abscess communicating by a tortuous sinus with an infected gallbladder. While this drainage wound was healing it was noted that her cough was improved. Following the secondary

operation at which the gall bladder was removed and dense old adhesions to the stomach and colon were released the asthma gradually ceased and the bronchial catarrh was readily cured. The patient is now, after four years, in robust health and free from asthma.

Robert T. Morris mentions a cure of bronchial asthma of four years' standing by short-circuiting the bowel for colonic stasis.

Reflexes along the phrenics are not unusual. Pottenger [5] has mentioned the retraction of the diaphragm in the presence of apical lung lesions.

More definite are the distressing and often serious attacks of hiccoughing due to abdominal irritations. This phenomenon is interesting from the standpoint of the curious and bizarre remedies that may bring relief. A sudden intentional fright is sometimes effectual. Curious weird maneuvers such as raising a glass of water above the head between each two acts of swallowing may be surprisingly effectual as in a very serious case seen a year ago, where this seemingly senseless method was effective for a half hour at a time. Several years ago I saw an old gentleman who had hiccoughed for several days until his fatigue was pitiful. "Christian science" suggestion treatment was said to have relieved him for several hours at a time, but permanent relief was found only on washing out the stomach through a tube.

The physician of Aristophanes advised for his illustrious patient the holding of the breath, the gargling of water, or in the last resort, the tickling of the nose with a feather to induce sneezing.

All these curious popular methods of relieving hiccoughing are effectual through interrupting the reflex arc either psychically or physiologically.

Case V. One year ago, I operated upon a gentleman of 48 years considerably prostrated by the presence of a massive perisigmoid abscess. Following the operation he began to hiccough and continued for eleven days during which time he was unable to take food. All methods, conventional and otherwise, were employed but only with temporary effect. Stomach lavage was of little value. The curious method mentioned above of taking a quantity of water and swallowing it while looking at the glass above his head, at first tried as a concession to the superstition of his wife, but later as the only means of gaining a few minutes' rest, proved more efficient than any medical suggestion. Relief was finally gained by washing the splenic flexure of the colon. Recovery followed.

I believe that hiccough as a post-operative condition or as a complication of prostrating disease is more frequently of colonic origin than from stomach. J. A. Grober [6] has indicated its frequent occurrence in disease of the colon, especially in ulcerative colitis. Colonic lavage or a high asafoetida enema will frequently avail where stomach washing does not bring relief.

Case VI. Mr. B., 50 years old, had formerly been a very heavy man of 350 lbs. He came to me, having lost 125 lbs. as a result of prolonged severe indigestion. For several years he had suffered from indigestion with distress after meals, gas, sour stomach and frequent attacks of prostrating headaches relieved by vomiting large quantities from a distended atonic stomach. X-ray confirmed the diagnosis of ulcer and located its site on the lesser curvature near the cardia.

For three years he had been exceedingly annoyed by a marked difficulty in deglutition. Unless he exercised great care in swallowing the food would enter the larynx and trachea with resulting choking. He had learned to bend his head and upper body far over to the side to avoid this inconvenience. A specialist had told him the vocal cords were paralyzed. Examination by Dr. Houston showed the larynx, palate and pharynx apparently normal. This difficulty very largely disappeared as the stomach condition improved. The only ready explanation of the facts is found in the assumption of a vagus irritation at the site of the gastric ulcer reflected outward along the laryngeal and pharyngeal nerves.

A familiar illustration of the reflex association of the larynx with the intestinal tract is the spasmodic strident inspiratory phonation on dilatation of the anal sphincter.

Case VII. Mr. T. F., a man of 40, had had for several years an esophageal pouch which had precluded the eating of solid food and had been the source of extreme annoyance. After operating for a chronic appendicitis, with no thought of any association with his esophageal pouch, I was surprised and highly pleased to find a steady improvement in his facility in swallowing so that he could again eat meats and vegetables with considerable comfort.

His diseased appendix had reflexly caused a cardio-spasm which had in turn produced a saccular pouch of the gullet. With the removal of the appendix the cardio-spasm was relieved and swallowing was thereby much improved though the pouch, of course, remained as a permanent condition.

Localized spasm of the stomach wall is more frequently a result of reflex irritation than of local gastric disease.

Thus Case [7] has found hour-glass stomach in sixteen cases of duodenal ulcer though never in ulcer of the stomach. It is also found in gall stone disease and with appendicitis.

The inflamed appendix is the cause through these reflex paths of many secondary conditions. Cardiospasm, pylorospasm, delayed duodenal emptying are frequently seen on the screen. Constipation or diarrhea of appendiceal origin are probably due to irritative hyperactivity of the cranio-spinal or sympathetic control. It is well to bear in mind that diarrhea in particular may be of appendix origin and that it may be out of all proportion to the degree of appendix disease.

Case VIII. represents such a condition. A married woman of twenty-two, Mrs. D., had had several sharp appendix attacks with some residual soreness in the intervals. For eighteen months there had developed a gradually increasing diarrhea until when she came to me she was having eight to ten soupy movements daily even on a constipating diet. Weakness and loss of nutrition had become moderately severe and she was steadily losing ground. A long thickened appendix was removed with immediate improvement of the bowel condition. The patient was very skeptical of the diagnosis and a moderate diarrhea continued for several weeks due, in my opinion, to the psychic state of apprehension. Only after two or three months did the bowels regain their normal activity with unselected diet.

That apprehension and fear are capable of causing this overactivity is well known to us all and was illustrated to me within the month in the case of a woman coming to me for a lump in the breast. I diagnosed a possible cancer and advised operation the following day. During the next twenty-four hours she had no less than ten passages with no other discoverable cause.

The condition of spastic colitis is of considerable interest and is as yet of uncertain mechanism. Up to the past few years the condition was looked upon by the large majority of practitioners as a true colitis and treated as such. At present three conceptions are current. The one looks upon the mucous colitis as the primary condition which reflexly brings about hyperacidity, ulcer, colonic stasis and, through the constipation, appendicitis. A second and more logical conception is that which understands the ulcer, hyperacidity, gall stones or other irritative lesion to be primary in the sequence. A third conception, and one which I believe is not sufficiently appreciated at least as a factor, is the explanation of the spastic colitis as a condition arising from psychic causes. Certain it is, whether we look upon it as the cause or as an incidental factor, that spastic colitis occurs in practically all the cases in neurasthenic, psychically irritable persons who are of the worrying, depressed, apprehensive, melancholic, introspective temperament.

In my experience the spastic colon has always been associated with some irritative lesion which had seemed to be the primary link in the chain and to cause a spasticity of greater or less degree varying with the psychic condition of the patient. The case cited in the early part of this paper (Case One), illustrates the paramount influence of the psychic condition and its control by a dominant interest outside oneself and the beneficial effect of absorbing occupation.

As a final illustration of reflex conditions, I wish to mention the constipation associated with an irritative lesion about the anus, painful hemorrhoids or fissure in ano. Even a tightly contracted anal sphincter may be the seat of an intractible constipation readily relieved by forcible dilatation.

Case IX. I recall an interesting case of long standing neuralgia due to severe anemia which had baffled many physicians in the course of the patient's extensive travels. The anemia was often of severe type, the hemaglobin reaching 35% at the time I saw her. In the pursuit of the ultimate cause I found a very obstinate constipation without evident reason other than a small but very painful hemorrhoid of long standing. The simple removal of this condition relieved the constipation. Normal bowel movements cleared away the toxemia. This in turn allowed the blood to regenerate after which the neuralgia ceased to trouble—truly a medical version of the "house that Jack built."

The above recounting of some of my own experiences is but a small incursion on a field so broad that volumes might be written on it. But it will serve as a suggestion that, where conditions are obscured and the search for cause is baffling, the recognition of the numerous and unexpected and remote lesions will enable us often to run down the ultimate cause, and ultimate cause lies at the foundation of rational therapy.

In explaining these reflexes I am not one of those enthusiasts who feel that the autonomic system is an open book. At present its physiology is vague, its pathways are confusing, and its interassociation with internal secretion, hormones and local innervation is intricate. Indeed one often finds an apparent intermingling of vagus and sympathetic influences and of stimulating and inhibitory effect. Thus while removing stitches from an abdominal wound I noted a marked stimulation of peristalsis, which we are told is a vagus irritative effect, yet the heart instead of being slowed thereby was running more than one hundred beats to the minute.

So let me join my voice with the conservatives who caution us not to look too expectantly for consistent effects from given causes, but, per contra, where effects are found explainable by autonomic reflexes a careful search backward over the numerous trails will often lead the eager pursuit directly to the door of the causative lesion.

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THE RING TO RING INCISION FOR HERNIORRHAPHY.

By HARRY M. SHERMAN, M. D., San Francisco.

Training in the operating-room as assistant so familiarizes the young surgeon of to-day to the making and closing of incisions that the whole subject is dropped from the text books on operative surgery. Still, beginning and finishing an operation are both important phases of it, and placing an incision so as to have it convenient, adequate, as harmless as possible and likely to heal easily with but little deforming scar, is not an unimportant matter. Kocher's teachings regarding the relations incisions should have to the cleavage planes of the skin, segmented incisions, and finally his scheme of normal incisions are, of course, still fresh; and there has been but little added to what he said, but rather a constant regard for and application of his dictum about the sparing of nerves in the planning of incisions, recognizing the nerve as the most highly differentiated tissue in the part, the one with the closest relation to the tissues in its distribution region, and the one that will be surely the slowest to repair if it repair at all.

Those of us who have had to get into and out of joints have all appreciated Kocher's scheme of incisions if we have been wise enough to use them —all who have had to work in the neck have found his oblique and collar incisions fulfil, in the first place all requirements of exposure, and in the last place all needs of healing. Lower down, on the trunk, his segmental incisions for the excision of ribs, for the removal of the appendix, for reaching iliac abscesses and the iliac arteries, for colostomy and sigmoidostomy, lead naturally to a transverse skin incision above the symphisis pubis as the skin opening for a suprapubic cystotomy. This is practically the identical incision Küstner suggested, for cosmetic purposes, at the Second International Congress for Gynecology and Obstetrics, in Geneva, Switzerland, in 1896, and that Rapin, at the same time and place, offered as the "incision ésthetique"